

Robotics: Science and Systems (RSS)

Jeff Trinkle and Yoky Matsuoka

■ *The conference Robotics: Science and Systems was held at the University of Washington in Seattle, from June 28 to July 1, 2009. More than 300 international researchers attended this single-track conference to learn about the most exciting robotics research and most advanced robotic systems. The program committee selected 39 papers out of 154 submissions. The program also included invited talks. The plenary presentations were complemented by workshops.*

The fifth annual international conference Robotics: Science and Systems (RSS) 2009 was held at the University of Washington in Seattle, USA, from June 28 to July 1, 2009. Within its first five years, RSS has established its position as the largest single-track mainstream robotics conference with papers of the highest quality covering a broad range of topics. This year's list of technical cosponsors grew to four: IEEE Robotics and Automation Society, Association for the Advancement of Artificial Intelligence, International Foundation of Robotics Research, and the Robotics Society of Japan. Despite the downturn in the economy, private sponsorship of RSS expanded, helping again to keep costs low for all participants, especially students. Notably, Springer sponsored the Springer Best Student Paper Award, while iRobot sponsored the iRobot Best Paper Award—worth \$2,500, and a Roomba for each author. All the papers can be accessed freely at roboticsproceedings.org.

If one were forced to identify a dominant theme or research trend in RSS 2009, one would have to choose machine learning. Authors adapted machine-learning techniques to problems in grasp selection based on variable-resolution object models, efficient globally consistent mapping using terabytes of data, discovery of object classifications from laser scans of otherwise unknown objects, leveraging Google's 3D Warehouse to reduce the need for manually generated training data, automatic generation of off-road vehicle paths based on terrain maps and past observations of wheel slippage, and a method for leveraging information in publically available aerial photographs to create globally consistent maps. In addition, new learning frameworks were developed, for example, a framework for learning non-parametric filters when no ground truth states are available and a framework for learning a control policy for a system characterized by a complex nonsmooth response surface. Finally, RSS is becoming increasingly interdisciplinary. Authors presented on topics including surgical techniques and cellular muscle actuator design.

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RSS 2009 brought together more than 300 researchers to Seattle from Europe, Asia, North America, and Australia to participate in a wide array of workshops during the first 1.5 days. Following the workshops were two and a half days of talks. The workshop titles illustrate the breadth of RSS: “Bridging the Gap between High-Level Discrete Representations and Low-Level Continuous Behaviors,” “Good Experimental Methodology in Robotics,” “Understanding the Human Hand for Advancing Robotic Manipulation,” “Regression in Robotics—Approaches and Applications,” “Algorithmic Automation,” “Integrating Mobility and Manipulation,” “Creative Manipulation: Examples Using the WAM,” “Aquatic Robots and Ocean Sampling,” “Autonomous Flying Vehicles: Fundamentals and Applications,” “Protein Structure, Kinematics, and Motion Planning,” and “Introduction to Microsoft Robotics Developer Studio.”

Following the RSS tradition, there were a number of invited talks by leaders in fields that inspire new approaches and insights in robotics. Michael Dickinson from the California Institute of Technology, USA, presented “Visually Mediated Behaviors of the Fruit Fly.” John Delaney from the University of Washington presented “Next Generation Ocean Sciences: The Leading Edge of an Environmental Renaissance.” Marc Ernst from the Max Planck Institute for Biological Cybernetics, Germany, presented “The Puzzle of Human Multisensory Perception: Optimal Integration for Action.” Finally, John Doyle from the California Institute of Technology, USA, presented “Rules of Engagement: The Architecture of Robust Evolvable Networks.”

This year’s Early Career Spotlight Talk featured a young rising star working in the area of haptic interaction, Katherine Kuchenbecker from the University of Pennsylvania, USA, who presented “Haptography: Creating Authentic Haptic Feedback from Recordings of Real Interactions.”

RSS 2009 received 154 contributed papers. The 39 accepted papers covered a wide range of topics in robotics spanning manipulation, locomotion, machine learning, localization, visual SLAM, haptics, biologically inspired design and control, and so on. The iRobot Best Paper Award went to Russ Tedrake of MIT and the Springer Best Student Paper Award was won by a team from University of Pennsylvania, Nathan Michael, Jonathan Fink, and Vijay Kumar.

Jeff Trinkle is a professor of computer science at Rensselaer Polytechnic Institute. His research focuses on planning and analysis of dexterous manipulation.

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